

The remaining five suckers were killed after 24 hours of isolation in the live-car. No whole eggs were found in the alimentary canals of these fish, and only small masses of oil and sand were present in the posterior portions of the intestines. The absence of eggs in the alimentary canals of these five fish, collected while feeding with the other 15, considered with the fact that the alimentary canals of the other 15 contained an average of 500 eggs each, suggests the possible consumption of at least 500 log perch eggs every 24 hours by each sucker following the schools of log perch. The actual destruction of eggs by each sucker is probably greater, however, as the broken eggs remain uncounted. The percentage of the total number of eggs produced by the female log perch of these schools, destroyed by the suckers was not ascertained. Several female log perch taken at random yielded about 100 mature eggs each, although the ovaries of these fish contained large numbers of immature eggs.

While considering the destruction of the log perch eggs by suckers it may be noted that the log perch themselves crowd about spawning individuals of their own species and devour the recently-laid eggs. Ten male log perch collected with the suckers were examined and from eight to 20 eggs were found in the stomach of each one.

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NOTES ON THE BREEDING AND INCUBATION PERIODS OF THE IOWA, DARTER, *ETHEOSTOMA IOWAE*
JORDAN AND MEEK.

While collecting embryological material during the spring of 1917 the eggs of the Iowa Darter, *Etheostoma iowae*, were obtained, fertilized and carried through the hatching period.

This darter is abundant in some of the foothill streams near Boulder, Colorado. Males in full breeding colors, with milt flowing freely when touched, and females with mature ova which could be discharged with slight pressure, were found as early as April 22 and as late as June 1, in Dry Creek, a small stream a few miles east of Boulder. These breeding fish were taken in water from three to four feet deep. The temperature of the water varied from 12°C. to 15°C., and its alkalinity equaled a 1-800 normal solution of Potassium Hydroxid. The darters were especially fond of pools where the bottom of the stream was covered with a heavy slime and masses of rotting vegetation, which had to be removed before the fish could be captured. When disturbed, the darters, which could be seen resting on top of this slime, burrowed into the soft debris by a series of quick movements of the pectoral and ventral fins. This preference for the deep pools at this time seemed to be correlated with the breeding activities of this species, as *Etheostoma iowae* was found usually under pebbles in swiftly running water and in shallow riffles during the fall, winter and early spring.

The incubation period of the eggs of *Etheostoma iowae* kept in running water at 13°C. to 16°C. in the laboratory, was comparatively short, occupying from 18 to 26 days. The germ ring was clearly visible by the twentieth hour after fertilization, and the majority of the eggs of one large series hatched within 30 minutes of each other on the twenty-fourth day. The newly-hatched darter was 3.4 millimeters in length.

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THE BREEDING HABITS OF THE VIVIPARUS PERCH, CYMATOGASTER.

The family Embiotocidae includes a number of interesting percoid fishes. They have all developed